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Notes:

1. Untranslatable words are replaced with asterisks (* ** *).
2. Texts in the figures are not translated and shown as it is.

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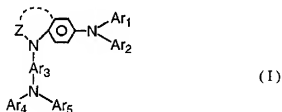
[Document Name]Description

[Title of the Invention]A new amino compound, its manufacturing method, and a use

[Claim(s)]

[Claim 1]An amino compound denoted by following general formula (I);

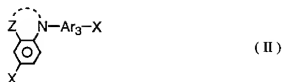
[Chemical formula 1]



(Independently, respectively) [among a formula] [Ar₁, Ar₂, Ar₄, and Ar₅]. An aryl group which may have a substituent, or a heterocyclic machine may be expressed, and; Ar₃ which may be a residue in which Ar₁, Ar₂ and Ar₄, and Ar₅ form a ring with a nitrogen atom may have a substituent. ; showing the Ally Wren machine or a divalent heterocyclic machine -- Z expresses a residue which forms a ring with a benzene ring and a nitrogen atom.

[Claim 2]A dihalogen compound denoted by following general formula (II);

[Chemical formula 2]



An amino compound denoted by (;X showing a residue in which;Z showing the Ally Wren machine or a divalent heterocyclic machine with which Ar_3 may have a substituent among a formula forms a ring with a benzene ring and a nitrogen atom expresses a halogen atom), following general formula (III), and (IV);

[Chemical formula 3]

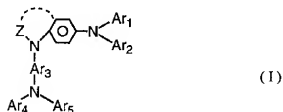


[Chemical formula 4]



(Independently, respectively) [among a formula] [Ar_1 , Ar_2 , Ar_4 , and Ar_5] a residue in which an aryl group which may have a substituent, or a heterocyclic machine is expressed, and Ar_1 , Ar_2 and Ar_4 , and Ar_5 form a ring with a nitrogen atom -- it may be -- manufacturing method [of an amino compound]; denoted by following general formula (I) making it react

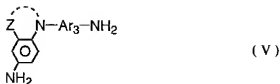
[Chemical formula 5]



(The inside of a formula, Ar_1 - Ar_5 , and Z are the above and homonymy).

[Claim 3]The Gia Minot compound denoted by following general formula (V);

[Chemical formula 6]



A halogenated compound denoted by (Z showing the Ally Wren machine or a divalent heterocyclic machine with which Ar_3 may have a substituent among a formula expresses a residue which forms a ring with a benzene ring and a nitrogen atom), following general formula (VI), and (VII);

[Chemical formula 7]

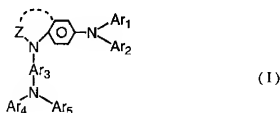


[Chemical formula 8]



(X, as for, Ar_1 , Ar_2 , Ar_4 , and Ar_5 express an aryl group which may have a substituent respectively independently, or a heterocyclic machine expresses a halogen atom among a formula) A manufacturing method of an amino compound denoted by following general formula (I) making it react;

[Chemical formula 9]



(The inside of a formula, Ar_1 - Ar_5 , and Z are the above and homonymy).

[Claim 4]An organic electroluminescence element, wherein at least one layer contains the amino compound according to claim 1 in an organic electroluminescence element provided with a two or more layers organic compound thin layer which contains a luminous layer or a luminous layer in inter-electrode [a pair of].

[Claim 5]An electro photography photo conductor characterized by electric charge transportation material being the amino compound according to claim 1 in an electro photography photo conductor which provides a photosensitive layer containing electric charge generating material and electric charge transportation material on a conductive base material.

[Claim 6]Electron hole transportation material which consists of the amino compound according to claim 1.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention provides the organic electroluminescence element and electro photography photo conductor which used the characteristic of the amino compound further about the new amino compound which has an electric charge transportation function and/or an optical conductivity function, and its manufacturing method.

[0002]

[Description of the Prior Art][the organic materials which have an electric charge transportation function or an optical conductivity function] Since there are low cost and various processability and many advantages of pollution-free **, various compounds, For example, an oxadiazole compound, a hydrazone compound, a PIRAZORIN compound, an OKISAZORU compound, an ARIRU amine compound, a benzidine compound, a stilbene compound, a butadiene compound, etc. are proposed.

[0003]There are an electro photography photo conductor and an organic electroluminescence element as art using the characteristic of such organic materials.

[0004]An electro photography method is one of the image formation methods invented by Carlsson. This method consists of transferring on paper the toner image acquired by carrying out image exposure, making an electrostatic latent image form on a photo conductor, making toner adhere on this electrostatic latent image, and developing negatives, after being charged in a photo conductor by corona discharge.

[0005]That suitable potential is held in a dark place as the fundamental characteristic required of the photo conductor in such an electro photography method, that there is little loss of the electric charge in a dark place, dissipating an electric charge promptly by light irradiation, etc. are mentioned.

[0006]As for the conventional electro photography photo conductor, inorganic light electric conduction objects, such as selenium, a selenium alloy, a zinc oxide, and a cadmium sulfide, have been used. Although it has an advantage, like these inorganic light electric conduction objects have high endurance, and there are many ** proof sheets, problems, like that it is inferior to processability and high a manufacturing cost has toxicity are pointed out.

[0007]In order to conquer these faults, development of an organic photo conductor is performed, but the present condition is that that with which it is not necessarily satisfied of electrophotographic properties, such as electrostatic property, sensitivity, and rest potential, cannot mean the electro photography photo conductor which used the organic photo conductor to the former for electric charge transportation material.

It has the outstanding electric charge transport capacity, and development of a durable electric charge transportation material is desired.

[0008]An organic electroluminescence element is mentioned as art using the electric charge transportation function of organic materials. Promising ** of the use as an inexpensive solid luminescence type large area full color display element is carried out, and, as for the electroluminescence device which uses an organic compound, many researches are done.

[0009]Generally the organic electroluminescence element comprises a pair of opposite electrodes which sandwiched the luminous layer and this luminous layer. When an electric field is impressed between two electrodes, an electron is poured in from the negative pole and, as for luminescence, an electron hole is poured in from an anode. When this electron and electron hole re-join together in a luminous layer and an energy level returns from a conducting zone to a valence band, it is a phenomenon which releases energy as a light.

[0010]The conventional organic electroluminescence element had high drive voltage compared with the inorganic electroluminescence device, and luminescence luminosity and its luminous efficiency were also low. Characteristic degradation did not result in utilization remarkably, either.

[0011]In recent years, the organic electroluminescence element which laminated the thin film containing an organic compound with the high fluorescence quantum efficiency which emits light by the low voltage not more than 10V is reported, and the interest is attracted (refer to it applied physics Letters, 51 volumes, 913 pages, and 1987).

[0012]The metal chelate complex was used for the fluorescent substance layer, it used the amine compound for the hole injection layer, and this method has obtained high-intensity green luminescence.

On the direct-current voltage of 6-7V, luminosity attains several 100cd/m^2 , the maximum luminous efficiency attains 1.5 lm/W, and it has the performance near a practical use field.

[0013]However, although luminescence intensity is improved by the improvement of composition as for the organic electroluminescence element by the present, it does not have still sufficient luminescence luminosity. It has the big problem of being inferior to the stability at the time of repetition use. Therefore, it has bigger luminescence luminosity, and has the electric charge transportation ability outstanding for development of the organic electroluminescence element excellent in the stability in the time of repetition use, and development of a durable electric charge transportation material is desired.

[0014]

[Problem to be solved by the invention] This invention was made in view of the above situations, and there is a place made into the purpose in providing a new organic compound useful as a durable electric charge transportation material.

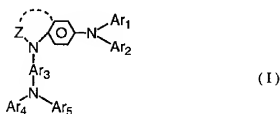
[0015] An object of this invention is to provide the manufacturing method of still such an organic compound.

[0016] An object of this invention is to provide the organic photoreceptor and organic electroluminescence element which use still such an organic compound.

[0017]

[Means for solving problem] Namely, new amino compound by which this invention is expressed with following general formula (I);

[Chemical formula 10]



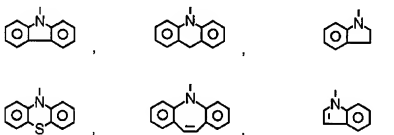
(Independently, respectively) [among a formula] [Ar₁, Ar₂, Ar₄, and Ar₅]. The aryl group which may have a substituent, or a heterocyclic machine may be expressed, and; Ar₃ which may be a residue in which Ar₁, Ar₂ and Ar₄, and Ar₅ form a ring with a nitrogen atom may have a substituent. ; showing the Ally Wren machine or a divalent heterocyclic machine -- and Z expresses the residue which forms a ring with a benzene ring and a nitrogen atom, it is related

with the electro photography photo conductor or electroluminescence device which uses the manufacturing method and its compound.

[0018]Ar₁, Ar₂, Ar₄, and Ar₅ express independently heterocyclic machines, for example, thienyl one etc., such as an aryl group, for example, a phenyl group, or diphenylene, among the above-mentioned formula, respectively. Those bases may have substituents, such as a low-grade alkyl group, a lower alkoxy group, or a JI substitution amino group.

[0019]Ar₁, Ar₂ and Ar₄, and Ar₅ -- a nitrogen atom -- a ring -- for example

[Chemical formula 11]



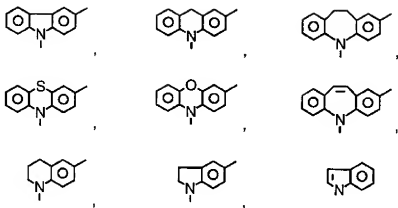
It may be a residue to form.

[0020]Especially a desirable thing is a phenyl group which has a phenyl group and a substituent as above-mentioned Ar₁, Ar₂, Ar₄, and Ar₅.

[0021]Ar₃ expresses divalent heterocyclic machines, such as the Ally Wren machine, for example, phenylene, diphenylene, or CHIOFEN. Those bases may have substituents, such as a low-grade alkyl group. Desirable things are a phenyl group and a diphenyl group.

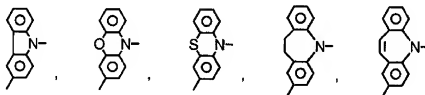
[0022]Z -- a benzene ring and a nitrogen atom -- a ring, for example,;

[Chemical formula 12]



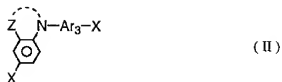
The residue to form is expressed, and it has substituents, such as a low-grade alkyl group, and may be. A desirable thing

[Chemical formula 13]



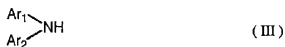
[0023]Dihalogen compound by which the amino compound denoted by the above-mentioned general formula (I) is expressed with following general formula (II);

[Chemical formula 14]



Amino compound denoted by (the above and homonymy; X express a halogen atom among a formula, as for Ar_3 and Z), following general formula (III), and (IV);

[Chemical formula 15]



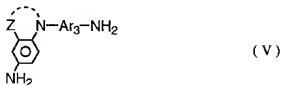
[Chemical formula 16]



(The inside of a formula, Ar_1 , Ar_2 , Ar_4 , and Ar_5 are the above and homonymy) It can manufacture by making it react.

[0024]The Gia Minot compound by which the amino compound denoted by general formula (I) is expressed with following general formula (V);

[Chemical formula 17]



(-- halogenated compound; to which Ar_3 and Z are expressed with the above, homonymy), following general formula (VI), and (VII) among a formula

[Chemical formula 18]



[Chemical formula 19]



(;X which shows the aryl group or heterocyclic machine with which Ar_1 , Ar_2 , Ar_4 , and Ar_5 may have a substituent independently among the formula, respectively expresses a halogen atom) It can boil making it react and can also manufacture more.

[0025]A Ullmann reaction can attain the above-mentioned reaction under existence of a basic compound or a transition metal compound catalyst, and a solvent.

[0026]As a basic compound used by this invention, although hydroxide of an alkaline metal, carbonate, carbonated water matter salt, or ARUKORATO is generally used, it is also possible to use an organic base like the 4th class ammonium compound, aliphatic amine, or aromatic amine. In this, carbonate and carbonated water matter salt of an alkaline metal or the 4th class ammonium are used as a desirable thing. Carbonate and carbonated water matter salt of the viewpoint of reaction velocity and heat stability to an alkaline metal are the most preferred.

[0027]As the transition metal or transition metal compound used at a reaction, although metal and those compounds, such as Cu, Fe, Co, nickel, Cr, V, Pd, Pt, and Ag, are used, for example, a point to copper and palladium, and those compounds of **** are preferred.

[0028]Although there is no limitation in particular as a copper compound and almost all copper compounds are used, Copper iodide, a cuprous chloride, copper I oxide, the first copper of bromination, the first copper of cyanidation, the first copper of sulfuric acid, the second copper of sulfuric acid, the second copper of chlorination, the second copper of water oxidization, the second copper of oxidization, the second copper of bromination, the second copper of phosphoric acid, the first copper of nitric acid, the second copper of nitric acid, carbonic acid copper, the first copper of acetic acid, the second copper of acetic acid, etc. are preferred. Especially CuCl , CuCl_2 , CuBr , CuBr_2 , CuI , CuO , Cu_2O , CuSO_4 , and $\text{Cu}(\text{OCOCH}_3)_2$ are easily preferred also in it at an available point.

[0029]Also as a palladium compound, a halogenation thing, sulfate, a nitrate, organic acid salt, etc. can be used.

[0030]The amount of a transition metal and its compound used is 0.5-500-mol% of halogenated compounds made to react.

[0031]Although the solvent used for a reaction should just be a solvent generally used, aprotic polarity solvents, such as nitrobenzene, JIMECHIRU formamide, dimethyl sulfoxide, and N-methyl pylori boss, are used preferably.

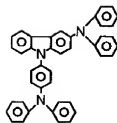
[0032]Although the reaction of this invention is generally performed at the temperature in 100-250 °C under normal pressure, even if it carries out under pressurization, of course, it is not cared about. A solvent can be removed and output can be obtained, after removing the solid which deposited after the end of a reaction, and in reaction liquid.

[0033]As a new amino compound denoted by general formula (I) which this invention provides, the following are specifically mentioned. The thing which has presented the compound of this invention restrictively is not indicating these listings by the intention limited to these, either.

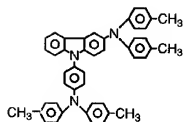
[0034]

[Chemical formula 20]

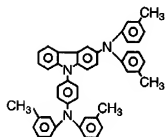
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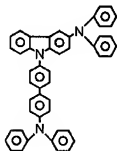
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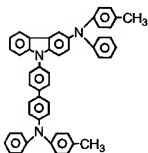
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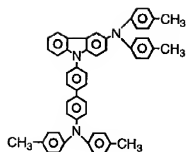
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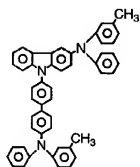
[0035]

[Chemical formula 21]

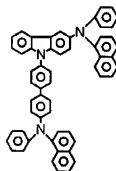
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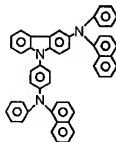
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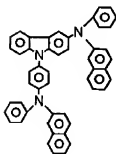
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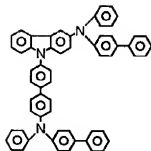
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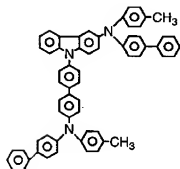
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[Chemical formula 22]

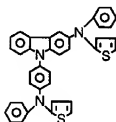
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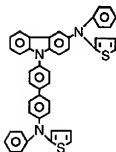
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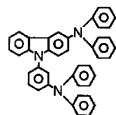
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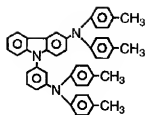
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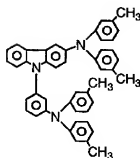
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[Chemical formula 23]

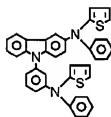
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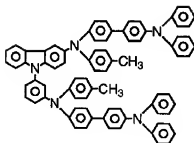
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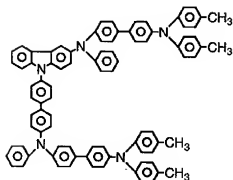
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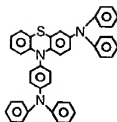
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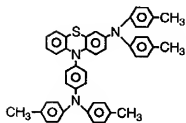
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[Chemical formula 24]

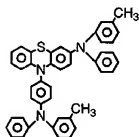
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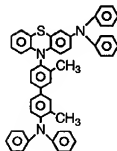
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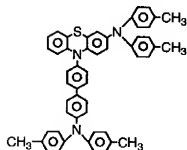
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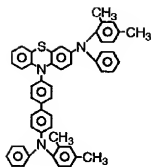
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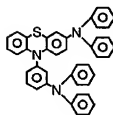
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[Chemical formula 25]

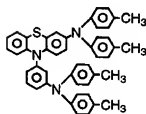
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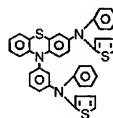
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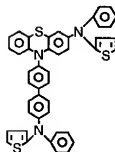
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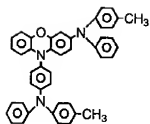
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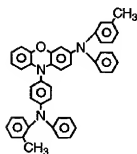
[0040]

[Chemical formula 26]

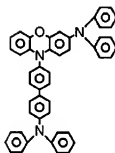
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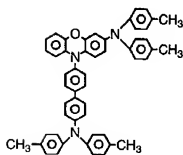
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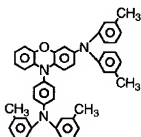
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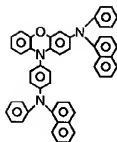
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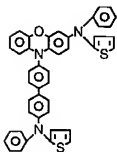
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[Chemical formula 27]

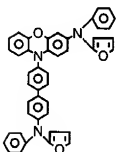
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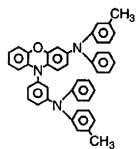
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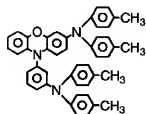
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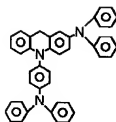
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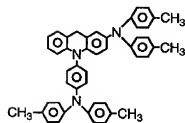
[0042]

[Chemical formula 28]

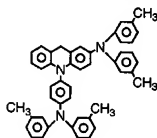
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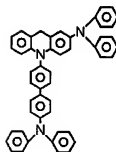
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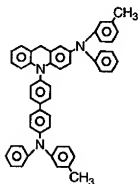
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(44)



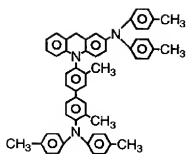
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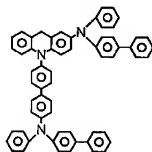
[0043]

[Chemical formula 29]

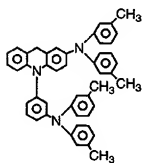
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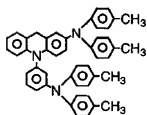
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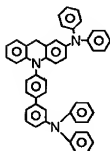
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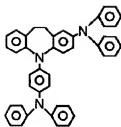
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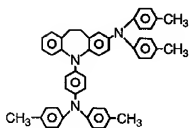
[0044]

[Chemical formula 30]

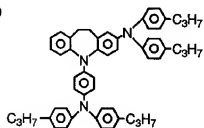
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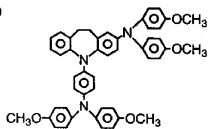
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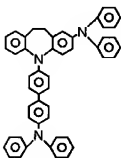
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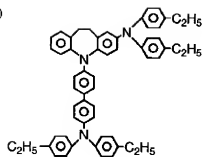
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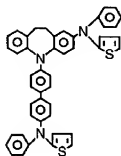
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[Chemical formula 31]

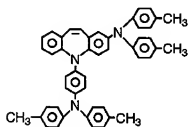
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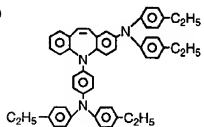
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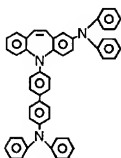
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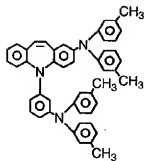
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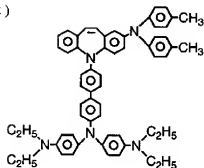
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[Chemical formula 32]

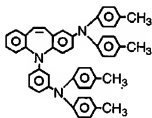
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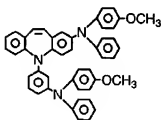
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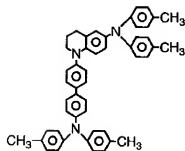
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(64)



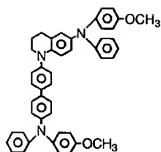
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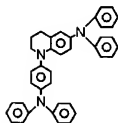
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[Chemical formula 33]

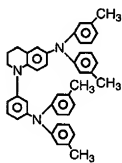
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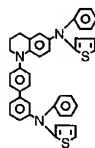
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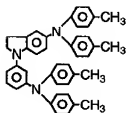
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(69)



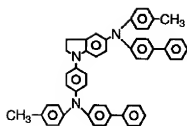
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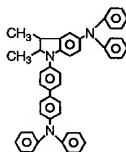
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[Chemical formula 34]

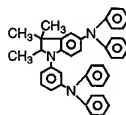
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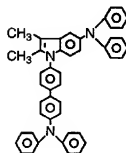
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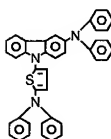
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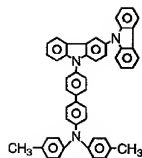
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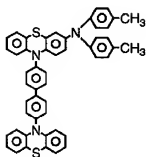
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[Chemical formula 35]

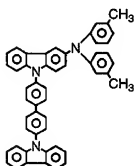
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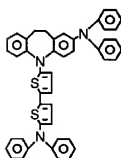
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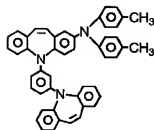
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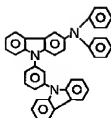
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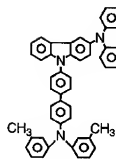
[0050]

[Chemical formula 36]

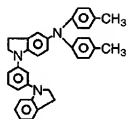
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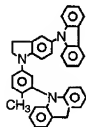
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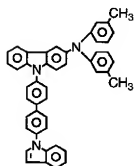
(83)



(84)



(85)



[0051]The above-mentioned amino compound denoted by a general formula has an optical conductivity function, an electric charge transportation function, and a luminescence function. Therefore, the amino compound of this invention fits use to an organic photoreceptor and an organic electroluminescence element. First, suppose that the use to the organic photoreceptor of the amino compound of this invention is explained, and the use to an organic electroluminescence element is subsequently explained.

[0052]Although it can be used also in which layer of an electro photography photo conductor, since the new amino compound shown by general formula (I) of this invention has the high electric charge transportation characteristic, it is desirable to use it as an electric charge transportation material.

[0053]Since the electric charge poured in from the electrode can be conveyed very efficiently or the compound of this invention acted as an electric charge transportation substance and it generated by optical absorption, it is possible to obtain sensitivity and the photo conductor excellent in the high-speed response. Since this compound is excellent in ozone resistance and the Mitsuyasu quality, it can obtain the photo conductor excellent in endurance.

[0054]The photo conductor which forms the photosensitive layer which distributes electric charge generating material and electric charge transportation material to a resin solution on a base material as an electro photography photo conductor, for example, The photo conductor which laminates bottom ****, a photosensitive layer, and a surface protection layer one by one is mentioned on the photo conductor which laminates a charge generating layer and an electric charge transportation layer as a photosensitive layer on a base material, the photo conductor which forms bottom ****, and an electric conduction layer and bottom **** on a base material, and forms a photosensitive layer on it, or a base material.

[0055]As a base material, what was made into that of foil or boards, such as copper, aluminum, iron, nickel, and stainless steel, or drum shape is used. What provided the layer of conductive compounds, such as vacuum deposition, a thing which carried out electroless deposition or a conductive polymer, oxidization in JUUMU, and tin oxide, for such metal by an

application or vapor deposition on paper or a plastic drum at paper, a plastic drum, etc. is usable. The aluminum pipe which aluminum was generally used, for example, gave drawing-out processing after extrusion processing is cut, What [cut and made about 0.2-0.3 mm to the outside surface using cutting tools, such as a diamond turning tool,] (cutting pipe), What drew the outside surface through and was finished by processing after carrying out deep-drawing processing of the aluminum disk and considering it as the shape of a cup (DI pipe), After carrying out impact processing of the aluminum disk and considering it as the shape of a cup, what drew the outside surface through and was finished by processing (EI pipe), the thing (ED pipe) cold-thinning-out-omission-processed after extrusion processing, etc. are mentioned. What cut these surfaces further may be used.

[0056]In forming bottom **** on such a base material, the oxidization coat produced by making anodize a support surface is used as bottom ****. When a base material is an aluminum alloy, it is effective to use an alumite layer as bottom ****. A low resistance compound is distributed the solution in which suitable resin was dissolved, and in it, and these solution and dispersion liquid are applied on the above-mentioned conductive base material, and it is formed also by making it dry. In this case, polyimide, polyamide, nitroglycerine cellulose, polyvinyl butyral, polyvinyl alcohol, etc. may be suitable, and may make these resin distribute a low resistance compound as a material used for bottom ****. As a low resistance compound, organic compounds, such as metallic compounds, such as tin oxide, titanium oxide, a zinc oxide, a zirconium dioxide, and magnesium fluoride, an organic color and an electronic suction nature organic compound, and an organic metal complex, are used suitably. As for the film thickness of a lower influence layer, about 0.2-3 micrometers is preferably desirable 0.1-5 micrometers.

[0057]The case where a charge generating layer and an electric charge transportation layer are laminated as a photosensitive layer in the photo conductor of this invention below is explained.

[0058]If in forming a charge generating layer on a conductive base you carry out vacuum deposition of the electric charge generating material, or you make it dissolve in a suitable solvent, and it applies or there is a suitable solvent or necessity about paints, application dryness will be carried out and the coating liquid which distributed in the solution in which binding resin was dissolved, and was produced will be formed. In view of an adhesive point, what was distributed in resin is good. As for the film thickness of a charge generating layer,

about 0.05-1 micrometer is preferably desirable 0.01 to 2 micrometer. Although 100 or less weight % is preferred to electric charge generating material as for the binding resin used for a charge generating layer, it is not this limitation. Two or more kinds of resin may be used combining it.

[0059]As an electric charge generating material used for a charge generating layer, for example Screw azo pigment, doria -- reel methane series dye, thiazine series dye, oxazine system dye, and xanthene dye. Cyanine dye, a styryl system pigment, PIRIRIUMU system dye, azo pigment, Organic system paints, dye, etc., such as quinacridone paints, indigo system paints, PERIREN system paints, polycyclic quinone system paints, screw benzimidazole system paints, in DASURON system paints, squarylium system paints, and phthalocyanine pigment, are mentioned. If it is the material which absorbs light and generates an electric charge carrier in very high probability also except this, even if it is which material, it can be used, but JISUAZO system paints and a phthalocyanine pigment are especially preferred.

[0060][as resin used with this electric charge generating material] For example, saturated polyester resin, polyamide resin, an acrylic resin, an ethylene-vinyl acetate copolymer, An ion bridge construction olefin copolymer (eye ONOMA), a styrene butadiene block copolymer, Poly arylate, polycarbonate, a VCM/PVC acetic acid vinyl copolymer, Cellulose ester, polyimide, styrene resin, polyacetal resin, Thermoplastic binders, such as FENOKISHI resin, an epoxy resin, urethane resin, Photo electroconductive polymer, such as heat hardening binders, such as silicone resin, phenol resin, melamine resin, xylene resin, alkyd resin, and a thermosetting acrylic resin, a photo-setting resin, poly-N-vinylcarbazole, polyvinyl pyrene, and polyvinyl anthracene, can be used.

[0061]With these resin, the above-mentioned electric charge generating material Methanol, ethanol, Alcohols, such as isopropanol, acetone, methyl ethyl ketone, Amide, such as ketone [, such as cyclohexanone,], N, and N-JIMECHIRU formamide, N, and N-JIMECHIRU aceto amide, Sulfo KISHIDO, such as dimethyl sulfoxide, a tetrahydro franc, dioxane, Ether, such as ethylene glycol monomethyl ether, acetic acid methyl, Ester, such as ethyl acetate, chloroform, a methylene chloride, dichloroethane, Fatty series halogenated hydrocarbon or benzene, such as a carbon tetrachloride and trichloroethylene, The sensitization coating liquid which distributed or dissolved in organic solvents, such as aromatic series, such as toluene, xylene,

ligroin, mono-chlorobenzene, and dichlorobenzene, and was prepared is applied on the above-mentioned conductive base material, it is made to dry and a charge generating layer is provided.

[0062]The photo conductor of this invention is obtained by providing the electric charge transportation layer containing electric charge transportation material and binder resin on the charge generating layer formed as mentioned above.

[0063]As binder resin, for example Polycarbonate, poly arylate, Saturated polyester resin, polyamide resin, an acrylic resin, an ethylene-vinyl acetate copolymer, An ion bridge construction olefin copolymer (eye ONOMA), a styrene butadiene block copolymer, A VCM/PVC acetic acid vinyl copolymer, cellulose ester, polyimide, Thermoplastic binders, such as styrene resin, polyacetal resin, and FENOKISHI resin, An epoxy resin, urethane resin, silicone resin, phenol resin, melamine resin, Photo electroconductive polymer, such as heat hardening binders, such as xylene resin, alkyd resin, and a thermosetting acrylic resin, a photo-setting resin, poly-N-vinylcarbazole, polyvinyl pyrene, and polyvinyl anthracene, can be used.

[0064]In forming the electric charge transportation layer of the photo conductor of this invention, the application solution produced by making dissolve electric charge transportation material and binder resin in a suitable solvent is applied on the above-mentioned charge generating layer, and is dried. As for the film thickness of an electric charge transportation layer, about 10-50 micrometers is preferably desirable 5-60 micrometers. Although the kind cannot generally prescribe the content of the electric charge transportation material in an electric charge transportation layer, it is desirable to carry out 0.5-1.2 weight-section addition preferably 0.3 to 1.5 weight section in general to binder resin 1 weight section.

[0065]Two or more kinds of compounds denoted by general formula (I) may be used for the electric charge transportation material used for this photo conductor, and can also be used for it in combination with other electric charge transportation materials. As other electric charge transportation materials used, a hydrazone compound, a PIRAZORIN compound, A styryl compound, a triphenylmethane compound, an oxadiazole compound, A carbazole compound, a stilbene compound, an ENAMIN compound, an OKISAZORU compound, Electron hole

transportation materials and fluorenone compounds, such as a bird phenylamine compound, a tetra-phenyl benzidine compound, and an azine compound, An anthra KINOJI methane compound, a diphenquinone compound, a SUCHIRUBEN quinone compound, Various things, such as electronic transportation materials, such as a thiopyran dioxide compound, an oxadiazole compound, a PERIREN tetracarboxylic acid compound, a full ORENIRIDEN methane compound, an anthraquinone compound, the Antron compound, and a cyano vinyl compound, can be used.

[0066][as said solvent used in the case of formation of an electric charge transportation layer] For example, aromatic series system solvents, such as benzene, toluene, xylene, and chlorobenzene, Ketone, such as acetone, methyl ethyl ketone, and cyclohexanone, methanol, Ester, such as alcohol, such as ethanol and isopropanol, ethyl acetate, and ethylcellosolve, Ether, such as halogenated hydrocarbon, such as a carbon tetrachloride, carbon tetrabromide, chloroform, dichloromethane, and tetra-chloro ethane, a tetrahydro franc, and dioxane, JIMECHIRU formamide, dimethyl sulfoxide, JIECHIRU formamide, etc. can be mentioned. These solvents may be used by an one-sort independent, or may use two or more sorts together as a mixed solvent.

[0067]In a photosensitive layer and lamination, the application of an electric charge transportation layer and a charge generating layer can be performed using various kinds of application devices, such as a publicly known thing. Specifically, a coating method with various immersion coating method, spray coating method, spinner coating methods, blade coating methods, roller coating methods, wire bar coating methods, etc. can be used.

[0068]The additive agent of well-known of the additive agent for raising membrane formation nature or flexibility in an electric charge transportation layer, the additive agent for controlling accumulation of rest potential, etc. may be made to contain among the photosensitive layer of this invention especially in lamination.

[0069]As these concrete compounds, halogenation paraffine, polychlorinated biphenyl, JIMECHIRUNAFUTAREN, o-terphenyl, m-terphenyl, p-terphenyl, A JIECHI kana phenyl, hydrogenation terphenyl, JIISO propyl biphenyl, A benzokana phenyl, JIISO propyl NAFUTAREN, dibenzofuran, Plasticizers, such as 9 and 10-dihydroxy phenanthrene, and

KURORANIRU, tetracyano KINOJI methane, Tetracyano ethylene, bird NITORORUORENON, dicyano benzoquinone, feeling agents of electronic suction ****, such as a tetra-KURORU phthalic anhydride, 3, 5 dinitrobenzoic acid, and a cyano vinyl compound, methyl violet, low DAMINB, cyanine dye, pyrylium salt, thia pyrylium salt, etc. -- increase -- admiration -- an agent -- it is usable.

[0070]Since the internal stress of the layer is reduced so that there are many the amounts of addition about a plasticizer, when a photosensitive layer is constituted by lamination with an electric charge transportation layer and a charge generating layer, the adhesiveness between an electric charge transportation layer and a charge generating layer is improved, and, in a monolayer type case, the adhesiveness between a photosensitive layer and a base material is improved. However, since problems, such as a fall of mechanical strength and a fall of sensitivity, will occur if too large, it is desirable to consider it as about 10-50 weight sections more preferably five to 80 weight section one to 100 weight section to electric charge transportation material 100 weight section.

[0071]increase -- admiration -- an agent -- ***** -- as for the amount of addition, it is desirable to consider it as about 0.5-8 weight sections more preferably 0.1 to 10 weight section 0.01 to 20 weight section to electric charge transportation material 100 weight section.

[0072]In the photosensitive layer in a photo conductor, especially electric charge transportation layer of this invention, an antioxidant may be added for the purpose of the prevention from ozone degradation. As an antioxidant, hindered phenol, hindered amine, Para Feni range amine, hydroquinone, a SUPIROKU romance, spiro Inn Danone, hydronalium quinoline and these derivatives, an organic phosphorus compound, an organosulfur compound, etc. are mentioned.

[0073]Although adhesiveness improves so that there are many amounts of addition of an antioxidant, if too large, problems, such as a fall of mechanical strength and a fall of sensitivity, will occur, and sufficient effect of few ***** and antioxidizing is not acquired. Therefore, it is desirable to consider it as about 3-20 weight sections more preferably one to 30 weight section 0.1 to 50 weight section to electric charge transportation material 100 weight section. When using an antioxidant and said plasticizer together, the total amount of the amount of addition

may be about 10-80 weight sections more preferably five to 100 weight section one to 120 weight section. Since crystal deposition is caused or adhesiveness does not improve so much when the solubility of a plasticizer or an antioxidant is low, or when the melting point is high, it is preferred that the melting point of a plasticizer or an antioxidant uses a compound 100 ** or less.

[0074]The photo conductor of this invention may provide an electric conduction layer between a base material and bottom ****. As an electric conduction layer, what distributed metal things, such as aluminum, iron, and nickel, in resin, and the thing which distributed metal oxides, such as conductive tin oxide, titanium oxide, antimony oxide, a zirconium dioxide, and ITO (indium, tin oxidation thing solid solution), in resin are used suitably.

[0075]The photo conductor of this invention may provide a surface protection layer on a photosensitive layer. As for the film thickness of a surface protection layer, 5 micrometers or less are desirable. As a material used for a surface protection layer, what distributed low resistance substances, such as remaining as it is or tin oxide, and indium oxide, for polymer, such as an acrylic resin, PORIA reel resin, polycarbonate resin, urethane resin, thermosetting resin, and a photo-setting resin, is usable. An organic plasma polymerization film may be used as a surface protection layer. An organic plasma polymerization film may also contain the 3rd fellows of oxygen, nitrogen, halogen, and a periodic law table, and the 5th fellows atom suitably if needed.

[0076]Next, the case where the compound shown by general formula (I) is used as a material of an organic electroluminescence element is explained. The organic electroluminescence element was typically shown in drawing 1 - drawing 4.

[0077]Among drawing 1, (1) is an anode and it contains the amino compound of this invention by which an organic electron hole pouring transportation layer (2), an organic luminous layer (3), and the negative pole (4) have taken the composition laminated one by one, and are expressed with the above-mentioned general formula (I) to this organic electron hole pouring transportation layer on it.

[0078]In drawing 2, (1) is an anode and an organic electron hole pouring transportation layer (2), an organic luminous layer (3) organicity electronic pouring transportation layer (5), and the negative pole (4) are laminated one by one on it. The amino compound of this invention expressed with the above-mentioned general formula (I) to this organic electron hole pouring transportation layer or an organic luminous layer is contained.

[0079]In drawing 3, (1) is an anode and it contains the amino compound of this invention by which an organic luminous layer (3), an organic electronic pouring transportation layer (5), and the negative pole (4) have taken the composition laminated one by one, and are expressed with the above-mentioned general formula (I) to this organic luminous layer on it. In drawing 4, (1) is an anode and an organic luminous layer (3) and the negative pole (4) have taken on it the composition laminated one by one, An organic luminescent material (6) and electric charge transportation material (7) are included in this organic luminous layer, and the amino compound of this invention expressed with the above-mentioned general formula (I) to this electric charge transportation material is used.

[0080]When an anode (1) and the negative pole (4) are connected by the lead (8) and each above-mentioned electroluminescence device impresses voltage to an anode (1) and the negative pole (4), an organic luminous layer (3) emits light.

[0081]A publicly known luminescence substance, a luminescence construction store, and the electric charge transportation material that performs carrier transport can also be used for an organic luminous layer, an organic electron hole pouring transportation layer, and an organic electronic pouring transportation layer if necessary.

[0082]Since the specific amino compound denoted by general formula (I) has small ionization potential and hole transportation ability is large, Luminescence starting potential required in order to make the organic electroluminescence device of this invention emit light may be low, therefore it is stabilized and it is thought that prolonged luminescence is closed if possible. When an amino compound is used as an organic photogen, it is thought that the function and thermal stability as a photogen of the amino compound itself have contributed.

[0083]A thing with a larger work function as a conductive substance used as an anode (1) of an organic electroluminescence device than 4 eV is good, Carbon, aluminum, vanadium, iron, cobalt, nickel, copper, zinc, Organic conductive resin, such as conductive metallic compounds, such as those alloys, such as tungsten, silver, gold, and platinum, tin oxide, indium oxide, antimony oxide, a zinc oxide, and a zirconium dioxide, and also poly CHIOFEN, and polypyrrole, is used.

[0084]A thing with a work function smaller than 4 eV as a metal which forms the negative pole (4) is good, and magnesium, calcium, tin, a lead, titanium, yttrium, lithium, gadolinium, ITTERUBIUMU, RUTENIUMU, manganese, and those alloys are used.

[0085]As long as an anode and the negative pole have necessity, they may be formed by the layer composition of two or more layers.

[0086]In an organic electroluminescence element, it is necessary to use an anode (1) or the negative pole (4) at least as a transparent electrode so that luminescence may be seen. Under the present circumstances, since transparency will be easy to be spoiled if a transparent electrode is used for the negative pole, it is preferred to use an anode as a transparent electrode.

[0087]using a conductive substance which was described above on the transparent substrate, when forming a transparent electrode -- means, such as vapor deposition and sputtering, and sol -- what is necessary is just to form so that desired light transmission nature and conductivity may be secured using the means of distributing the gel method or resin and applying

[0088]If have moderate intensity as a transparent substrate, it is not damaged with the heat by vapor deposition etc., it will not be limited at the time of organic electroluminescence device production especially if transparent, but what starting is illustrated, It is also possible to use a glass substrate, transparent resin, for example, polyethylene, polypropylene, polyether sulphone, a polyether ether ketone, etc. These may be used although commercial items, such as ITO and NESA, are known as that by which the transparent electrode was formed on the

glass substrate.

[0089]Production of the organic electroluminescence element of the composition of drawing 1 is explained in illustration using the above-mentioned electrode. First, an organic electron hole pouring transportation layer (2) is formed on the above-mentioned anode (1). the liquid which dissolved with the solution which an organic electron hole pouring transportation layer (2) may vapor-deposit the amino compound denoted by said general formula (I) carried out, and may be formed, and which carried out and dissolved this amino compound, and suitable resin -- a dip coat -- a spin coat may be carried out and it may form.

[0090]What is necessary is for the thickness to be usually 1-500 nm, when forming by the vapor-depositing method, and just to form in about 5-1000 nm, when forming by the applying method.

[0091]It is necessary to make high impressed electromotive force for making light emit, so that the film thickness to form is thick, and luminous efficiency tends to cause degradation of an organic electroluminescence element bad. If film thickness becomes thin, luminous efficiency will become good, but it becomes easy to *****, and the life of an organic electroluminescence element becomes short.

[0092]May use the electric charge transportation material of general formula (I), combining it with other electric charge transportation materials, and such an electric charge transportation material A luminous layer. Or the compound which has the electron hole pouring effect of having excelled to the luminescence substance, and prevented movement into the electronic injection layer or electronic transportation material of an exciton generated by the luminous layer, and was excellent in thin film organization potency is mentioned.

[0093]Specifically A phthalocyanine compound, a naphthalocyanine compound, a porphyrin compound, oxadiazole and doria -- ZORU, imidazole, imidazolone, and imidazole thione. PIRAZORIN, PIRAZORON, tetrahydro imidazole, OKISAZORU, oxadiazole, hydrazone, ASHIRU hydrazone, poly ARIRU Alekan, SUCHIRUBEN, butadiene, and a benzidine type -- doria -- reel amine and a diamine type -- doria, [amine / reel] Although there are polymer

materials, such as those derivatives and polyvinyl carbazole, polysilane, and a conductive polymer, etc., it is not limited to these.

[0094][as the organic photogen used for an organic luminous layer (3), and a luminescence construction store] It is [a publicly known thing] usable and For example, EPIDO lysine, 2,5-bis[5,7-G t-pentyl 2-benzoxazolyl] CHIOFEN, 2 and 2'-(1, 4-phenylene divinylene) screw benzothia ZORU, 2 and 2'-(4 and 4'-biphenylene) screw benzothia ZORU, 5-methyl 2-[4-(5-methyl 2-benzoxazolyl) phenyl] vinyl] BENZOOKI Southall, 2, 5-bis(5-methyl 2-benzoxazolyl) CHIOFEN, Anthracene, NAFUTAREN, phenanthrene, pyrene, KURISEN, PERIREN, PERINON, 1, 4-diphenyl butadiene, tetra-phenyl butadiene, Kumarin, AKURIJIN, SUCHIRUBEN, 2-(4-biphenyl)-6-phenylbenzo KISAZORU, Aluminum tris oxine, magnesium screw oxine, bis(benzo8-KINORINORU)zinc, Bis(2-methyl 8-KINORINORU)aluminum oxide, indium tris oxine, aluminum tris (5-methyl oxine), lithium oxine, gallium tris oxine, a calcium screw (5-chloro oxine), Poly zinc-bis(8-hydroxy 5-KINORI noryl)methane, dilithium EPINDORI dione, zinc screw oxine, 1, 2-phtalo PERINON, 1, and 2-naphthalo PERINON etc. can be mentioned.

[0095]General fluorescence dye, for example, fluorescence coumarin dyestuff, fluorescence PERIREN dye, fluorescence Piran dye, fluorescence thiopyran dye, fluorescence poly methine dye, fluorescence MESHIANIN dye, fluorescence imidazole dye, etc. can be used. Among these, as a desirable thing, a chelation OKISHINOIDO compound is mentioned especially.

[0096]The monolayer composition of the above-mentioned luminescence substance may be sufficient as an organic luminous layer, and in order to adjust the characteristics, such as a color of luminescence, and intensity of luminescence, it is good also as multilayered constitution. Two or more sorts of luminescence substances may be mixed, or it may dope to a luminous layer.

[0097]the liquid which dissolved with the solution which an organic luminous layer (3) may vapor-deposit the above luminescence substances, and may be formed, and which carried out and dissolved this luminescence substance, and suitable resin -- a dip coat -- a spin coat may be carried out and it may form. The amino compound denoted by general formula (I) may be used as a luminescence substance or an organic luminous layer.

[0098]What is necessary is for the thickness to be usually 1-500 nm, when forming by the vapor-depositing method, and just to form in about 5-1000 nm, when forming by the applying method.

[0099]It is necessary to make high impressed electromotive force for making light emit, so that the film thickness to form is thick, and luminous efficiency tends to cause degradation of an organic electroluminescence element bad. If film thickness becomes thin, luminous efficiency will become good, but it becomes easy to *****, and the life of an organic electroluminescence element becomes short.

[0100]Next, the above mentioned negative pole is formed on an organic luminous layer.

[0101]As mentioned above, although the case where laminated an organic electron hole pouring transportation layer (2), a luminous layer (3), and the negative pole (4) one by one, and an organic luminescence device was formed on an anode (1) was explained, Laminate a luminous layer (3) organicity electron hole pouring transportation layer (2) and an anode (1) one by one on the negative pole (4), or, Luminous-layer (3) organicity electronic pouring transportation layer (5) In an anode (1) top, Laminate the negative pole (4) one by one, or on an anode (1) An organic hole pouring transportation layer (2), Of course, it does not matter even if a luminous layer (3) organicity electronic pouring transportation layer (5) and the negative pole (4) are laminated one by one or it laminates an organic electronic pouring transportation layer (5), a luminous layer (3), and an anode (1) one by one on the negative pole (4).

[0102]1 set of transparent electrodes of the negative pole and an anode connect suitable leads (8), such as a Nichrome wire, a gold streak, copper wire, and a platinum line, to each electrode, and an organic luminescence device emits light by impressing the suitable voltage (Vs) for two electrodes.

[0103][as an electronic transportation material used when forming an organic electronic injection layer] The compound which has the capability to convey an electron, has the electronic pouring effect of having excelled to the luminous layer or the luminescence substance, and prevented movement into the hole injection layer or electron hole transportation material of an exciton generated by the luminous layer, and was excellent in thin film organization potency is mentioned.

[0104]Although there are a fluorenone, anthra KINOJI methane, diphenquinone, SUCHIRUBEN quinone, thiopyran dioxide, oxadiazole, PERIREN tetracarboxylic acid, full ORENIRIDEN methane, anthraquinone, Antron, etc. and those derivatives, specifically, It is not limited to these.

[0105]The organic electroluminescence element of this invention is applicable to various kinds of display devices or a display device.

[0106]An embodiment is indicated below and this invention is further explained to it. the increase of the luminescence substance used the organic electroluminescence element of this invention attaining improvement in luminous efficiency and luminescence luminosity, and reinforcement, and combining it, a luminescence construction store, and electric charge transportation material -- admiration -- an agent -- it is not limited to element manufacturing methods, such as resin and electrode material.

[0107][the 200-ml 3 mouth flask which formed the synthetic example 1 (composition of compound (1)) water-cooled condenser tube] 24.8 g (0.05 mol) of N-(4-iodine phenyl)-3-iodine carbazole, 16.7 g (0.1 mol) of N and N-diphenylamine, the anhydrous potassium carbonate 16.9g (0.1 mol), 1.27 g (0.02 mol) of copper powder, and 100 ml of nitrobenzene were mixed, and it was made to react under flowing-back temperature for 24 hours. 200 ml of dichloromethane extracted the reaction product, and concentration hardening by drying of the insoluble part was carried out after [classified by **] removal.

[0108]Column chromatography refines this (carrier; it develops by silica gel, *****:toluene / n-hexane =1/2), N of the purpose -(4-N', N'-diphenylamino 1-phenyl)-(3-N"N"-diphenylamino)-

15.3 g of carbazole was obtained (53.0% of ****). The melting point was 186-187 **. The infrared absorption spectrum of the obtained compound (1) is shown in drawing 5.

[0109][the 200-ml 3 mouth flask which formed the synthetic example 2 (composition of compound (2)) water-cooled condenser tube] 24.8 g (0.05 mol) of N-(4-iodine phenyl)-3-iodine carbazole, N and N-JI (p-trill) amine 16.7g (0.1 mol), the anhydrous potassium carbonate 16.9g (0.1 mol), 1.27 g (0.02 mol) of copper powder, and 100 ml of nitrobenzene were mixed, and it was made to react under flowing-back temperature for 24 hours. 200 ml of dichloromethane extracted the reaction product, and concentration hardening by drying of the insoluble part was carried out after [classified by **] removal.

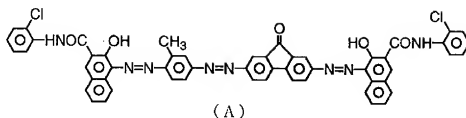
[0110]Column chromatography refines this (carrier; it develops by silica gel, *****:toluene / n-hexane =1/2), 16.3 g of the target N-[4-N' and N'-JI (p-trill) amino 1-phenyl]-[3-N"N"-JI (p-trill) amino]-carbazole was obtained (51.5% of ****). The melting point was 165-167 **.

[0111][the 200-ml 3 mouth flask which formed the synthetic example 3 (composition of compound (3)) water-cooled condenser tube] 13.7 g (0.05 mol) of N-(4-aminophenyl)-3-amino carbazole, 65.4 g (0.3 mol) of m-iodine toluene, the anhydrous potassium carbonate 33.8g (0.2 mol), 2.54 g (0.04 mol) of copper powder, and 70 ml of nitrobenzene were mixed, and it was made to react under flowing-back temperature for 24 hours. 200 ml of dichloromethane extracted the reaction product, and concentration hardening by drying of the insoluble part was carried out after [classified by **] removal.

[0112]Column chromatography refines this (carrier; it develops by silica gel, *****:toluene / n-hexane =1/2), 9.4 g of the target N-[4-N' and N'-JI (p-trill) amino 1-phenyl]-[3-N"N"-JI (p-trill) amino]-carbazole was obtained (29.7% of ****). The melting point was 147-149 **.

[0113][Application to the electric charge transportation material of an electro photography photo conductor] Tris azo compound denoted by the embodiment 1 following general formula [A];

[Chemical formula 37]



0.45 copy and 0.45 copy of polyester resin (Byran 200; made by Toyobo Co., Ltd.) were distributed by SANDOMIRU with 50 copies of cyclohexanones. The immersion coating method was used on the aluminum drum of 80 phi, after applying the distributed thing of the obtained tris azo compound so that dry film thickness may serve as $0.3\text{g} / \text{m}^2$, it was dried, and the charge generating layer was formed.

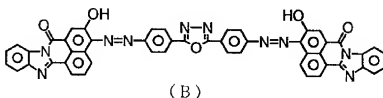
[0114] Thus, the solution which dissolved 50 copies of amino compounds (1) and 50 copies of polycarbonate resin (pan-light K-1300; made in Teijin Chemicals) in 400 copies of 1 and 4-dioxanes on the obtained charge generating layer was applied so that dry film thickness might be set to 20 micrometers, and it was dried, and the electric charge transportation layer was formed. Thus, the electro photography photo conductor which has a photosensitive layer which consists of two-layer was obtained.

[0115] The electro photography copying machine (Minolta Co., Ltd. make; EP-5400) of marketing of the photo conductor obtained in this way is used, -Corona electrical charging was carried out by 6Kv, and extinction ratio DDR_{10} of initial potential when it is neglected to in the dark one for light exposure $E_{1/2}$ (lux-sec), and 1 second (%) was measured. [which was required in order to set initial surface potential $V_0(V)$ and initial potential to one half]

[0116] The photo conductor which uses respectively the amino compound (2), (3), and (4) instead of the amino compound (1) used in the thing of the same composition, however Embodiment 1 by the same method as two to embodiment 4 Embodiment 1 was produced. About the photo conductor obtained in this way, V_0 , $E_{1/2}$, and DDR_1 were measured by the same method as Embodiment 1.

[0117]Screw azo compound denoted by the embodiment 5 following general formula (B);

[Chemical formula 38]



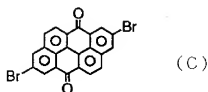
0.45 copy and 0.45 copy of polystyrene resin (molecular weight 40000) were distributed by SANDOMIRU with 50 copies of cyclohexanones.

[0118]After applying the distributed thing of the obtained screw azo compound on the aluminum drum of 80 phi so that 0.3 g of dry film thickness may serve as $/m^2$, it was made to dry, and the charge generating layer was formed. Thus, the solution which dissolved 50 copies of amino compounds (5) and 50 copies of polyarylate resin (U-100; made by Unitika, Ltd.) in 400 copies of 1 and 4-dioxanes on the obtained charge generating layer was applied so that dry film thickness might be set to 25 micrometers, and it was dried, and the electric charge transportation layer was formed. Thus, the electro photography photo conductor which has a photosensitive layer which consists of two-layer was produced.

[0119]The photo conductor which uses respectively the amino compound (14), (16), and (20) instead of the amino compound (5) used in the thing of the same composition, however Embodiment 5 by the same method as six to embodiment 8 Embodiment 5 was produced. About the photo conductor obtained in this way, V_o , $E_{1/2}$, and DDR_1 were measured by the same method as Embodiment 1.

[0120]Polycyclic quinone system paints denoted by the embodiment 9 following general formula (C);

[Chemical formula 39]



0.45 copy and 0.45 copy of polycarbonate resin (pan-light K-13000: made in Teijin Chemicals) were distributed by SANDOMIRU with 50 copies of dichloroethane. After applying the distributed thing of the obtained polycyclic quinone system paints on the aluminum drum of 80 phi so that 0.4 g of dry film thickness may serve as $/m^2$, it was made to dry, and the charge generating layer was formed. Thus, the solution which dissolved 60 copies of amino compounds (28) and 50 copies of polyarylate resin (U-100; made by Unitika, Ltd.) in 400 copies of 1 and 4-dioxanes on the obtained charge generating layer was applied so that dry film thickness might be set to 18 micrometers, and it was dried, and the electric charge transportation layer was formed. Thus, the electro photography photo conductor which has a photosensitive layer which consists of two-layer was produced.

[0121]The photo conductor which uses the amino compound (33) and (38) respectively instead of the amino compound (28) used in the thing of the same composition, however Embodiment 10 by the same method as ten to embodiment 11 Embodiment 10 was produced. About the photo conductor obtained in this way, V_o , $E_{1/2}$, and DDR_1 were measured by the same method as Embodiment 1.

[0122]0.45 copy of embodiment 12 titaniumphthalocyanine and 0.45 copy of butyral resin (BX-1; made by Sekisui Chemical Co., Ltd.) were distributed by SANDOMIRU with 50 copies of dichloroethane. An immersion coating method is used for the distributed thing of the obtained phthalocyanine pigment on the alumite drum of 80 phi, and dry film thickness is 0.3 micrometer. After applying so that it may become, it was made to dry and the charge generating layer was formed. Thus, the solution which dissolved 50 copies of amino compounds (45) and 50 copies of polycarbonate resin (PC-Z; made by Mitsubishi Gas Chemical Co., Inc.) in 400 copies of 1 and 4-dioxanes on the obtained charge generating layer was applied so that dry film thickness might be set to 18 micrometers, and the electric charge transportation layer was formed. Thus, the electro photography photo conductor which has a photosensitive layer which consists of two-layer was produced.

[0123]About the photo conductor obtained in this way, V_o , $E_{1/2}$, and DDR_1 were measured by the same method as Embodiment 1.

[0124]It is made to dissolve, agitating enough 50 copies of embodiment 13 copper phthalocyanines, and 0.2 copy of tetra-nitroglycerine copper phthalocyanine to 500 copies of strong sulfuric acid 98%, After opening this in 5000 copies of water and depositing the optical conductive material constituent of copper phthalocyanine and tetra-nitroglycerine copper phthalocyanine, it filtered and washed and dried at 120 °C under decompression. Ten copies of obtained optical conductivity constituents in this way 22.5 copies of thermosetting acrylic resins (AKURIDIKU A405; made in great Japan, Inc.), 7.5 copies of melamine resin (super BEKKAMIN J820; made in great Japan, Inc.), Put methyl ethyl ketone and xylene into a ball mill pot with 100 copies of partially aromatic solvents mixed in an equivalent amount, distribute 15 copies of amino compounds (53) for 48 hours, and photosensitive coating liquid is prepared, Spray coating of this coating liquid is carried out on the alumite drum of 80 phi, it dried and the photosensitive layer about 15 micrometers thick was made to form. Thus, the monolayer type photo conductor was produced.

[0125]About the photo conductor obtained in this way, the same method as Embodiment 1, however corona electrical charging were performed by +6Kv, and V_o , $E_{1/2}$, and DDR_1 were measured.

[0126]The photo conductor which uses the amino compound (56) and (61) respectively instead of the amino compound (53) used in the thing of the same composition, however Embodiment 13 by the same method as 14 to embodiment 15 Embodiment 13 was produced. About the photo conductor obtained in this way, V_o , $E_{1/2}$, and DDR_1 were measured by the same method as Embodiment 13.

[0127]The measurement result of V_o of the photo conductor obtained in Embodiments 1-15, $E_{1/2}$, and DDR_1 is summarized in Table 1, and is shown.

[0128]

[Table 1]

	VO(V)	E 1/2(Lux•sec)	DDR ₁ (%)
实施例 1	- 6 6 0	1 . 0	2 . 7
实施例 2	- 6 6 0	0 . 8	2 . 8
实施例 3	- 6 5 0	0 . 9	3 . 0
实施例 4	- 6 6 0	0 . 8	2 . 6
实施例 5	- 6 6 0	1 . 0	2 . 7
实施例 6	- 6 6 0	0 . 8	3 . 0
实施例 7	- 6 5 0	0 . 9	3 . 5
实施例 8	- 6 6 0	1 . 0	2 . 8
实施例 9	- 6 6 0	0 . 7	2 . 9
实施例 10	- 6 5 0	0 . 8	3 . 4
实施例 11	- 6 7 0	0 . 9	2 . 5
实施例 12	- 6 6 0	0 . 7	2 . 8
实施例 13	- 6 6 0	1 . 0	2 . 7
实施例 14	- 6 5 0	0 . 9	3 . 3
实施例 15	- 6 6 0	0 . 8	2 . 8

[0129]As shown in Table 1, also with the laminated type or the monolayer type, there are photo conductors of enough of this example, and their electric charge maintenance ability is small to the grade whose dark extinction ratio is also sufficiently usable as a photo conductor, and excellent in it also in sensitivity.

[0130]Although the repetition on-the-spot photo test at the time of right electrification by a commercial electro photography copying machine (Minolta Camera Co., Ltd. make; EP-350Z) was done in the photo conductor of Embodiment 13, even if it performed 1000 copies, in the last picture, story tonality is excellent, there is no sensitivity change, and the clear picture was

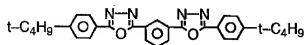
obtained the first stage. It turns out that the repetition characteristic of the photo conductor of this example is also stable.

[0131][Application to an organic electroluminescence element] On the substrate of embodiment 16 indium-tin-oxide covering glass, the amino compound (1) was vapor-deposited as an organic electron hole pouring transportation layer, and the 50-nm-thick thin film was formed. Next, the thin film was formed so that aluminum tris oxine might be vapor-deposited as an organic luminous layer and it might become a thickness of 50 nm. Finally, the thin film was formed so that it might become a thickness of 200 nm by vapor deposition about magnesium as the negative pole. Thus, the organic electroluminescence device was produced.

[0132]In 17 to embodiment 19 Embodiment 16, the organic electroluminescence element was produced completely like Embodiment 16 except replacing with the amino compound (5), (12), and (19) instead of using a compound (1).

[0133]The 70-nm-thick thin film was formed for the amino compound (25) by vapor deposition as an organic electron hole pouring transportation layer on the substrate of embodiment 20 indium-tin-oxide covering glass. Next, the thin film was formed so that aluminum tris oxine might be vapor-deposited as an organic luminous layer and it might become a thickness of 100 nm. Then, the thin film was formed so that the following oxadiazole compound (D) might be vapor-deposited as an organic electronic pouring transportation layer and it might become a thickness of 50 nm.

[Chemical formula 40]



(D)

Finally, the thin film was formed so that it might become a thickness of 200 nm by vapor deposition about magnesium as the negative pole. Thus, the organic electroluminescence element was produced.

[0134]In 21 to embodiment 23 Embodiment 20, the organic electroluminescence element was produced completely like Embodiment 20 except replacing with the amino compound (32), (44), and (52) instead of using a compound (25).

[0135]On the substrate of embodiment 24 indium-tin-oxide covering glass, the amino compound (58) was vapor-deposited as an organic luminous layer, and the 50-nm-thick thin film was formed. Next, the thin film was formed so that an oxadiazole compound (A) might be vapor-deposited as an organic electronic pouring transportation layer and it might become a thickness of 20 nm. Finally, the thin film was formed so that it might become a thickness of 200 nm by vapor deposition about Mg and Ag of an atomic ratio of 10:1 as the negative pole. Thus, the organic electroluminescence element was produced.

[0136]Vacuum deposition of the compound (20) was carried out on the substrate of embodiment 25 indium-tin-oxide covering glass, and the hole injection layer of 20 nm of film thickness was obtained. Vacuum deposition of the N and N'-diphenyl N, N'-(3-methylphenyl)-1, and 1'-biphenyl 4 and 4'-Gua Min was carried out, and the electron hole transportation layer of 40 nm of film thickness was obtained. Next, the thin film was formed so that it might become a thickness of 50 nm by vapor deposition about a tris (8-hydroxy quinoline) aluminium complex. Finally, the thin film was formed so that it might become a thickness of 200 nm by vapor deposition about Mg and Ag of an atomic ratio of 10:1 as the negative pole. Thus, the organic electroluminescence element was produced.

[0137]On the substrate of embodiment 26 indium-tin-oxide covering glass, vacuum deposition of the N and N'-diphenyl N, N'-(3-methylphenyl)-1, and 1'-biphenyl 4 and 4'-Gua Min was carried out, and the electron hole transportation layer of 60 nm of film thickness was obtained. Next, the luminous layer was formed so that it might become a thickness of 60 nm by vacuum deposition at a rate of 3:1 about a tris (8-hydroxy quinoline) aluminium complex and an amino compound (65). Finally, the thin film was formed so that it might become a thickness of 200 nm by vapor deposition about Mg and Ag of an atomic ratio of 10:1 as the negative pole. Thus, the

organic electroluminescence element was produced.

[0138] Dichloromethane was made to dissolve a compound (68) on the substrate of embodiment 27 indium-tin-oxide covering glass, and the hole injection layer of 50 nm of film thickness was obtained by spin coating. The luminous layer was formed so that it might become a thickness of 20 nm by vapor deposition about a tris (8-hydroxy quinoline) aluminium complex. The electronic injection layer of 20 nm of film thickness of an oxadiazole compound (A) was obtained by the vacuum evaporation method. Finally, the thin film was formed so that it might become a thickness of 200 nm by vapor deposition about Mg and Ag of an atomic ratio of 10:1 as the negative pole. Thus, the organic electroluminescence element was produced.

[0139] In 28 to embodiment 29 Embodiment 27, the organic electroluminescence element was produced completely like Embodiment 27 except replacing with the amino compound (34), (43), and (62) instead of using a compound (68).

[0140] The tetrahydro franc was made to dissolve a compound (74), a tris (8-hydroxy quinoline) aluminium complex, and poly methyl methacrylate by the ratio of 3:2:5 on the substrate of embodiment 30 indium-tin-oxide covering glass, and the luminous layer of 100 nm of film thickness was obtained with the spin coating method. Next, the thin film was formed so that it might become a thickness of 200 nm by vapor deposition about Mg and Ag of an atomic ratio of 10:1 as the negative pole. Thus, the organic electro luminescence (EL) element was produced.

[0141] The glass electrode was made into the anode for the organic electroluminescence element obtained in evaluation embodiments 16-30, and luminescence luminosity when the direct-current voltage of 5V was applied was measured. A measurement result is summarized in Table 2 and shown.

[0142]

[Table 2]

	輝度(cd/m ²)
実施例16	5 8 7
実施例17	6 4 5
実施例18	7 1 0
実施例19	7 8 9
実施例20	8 0 3
実施例21	8 5 5
実施例22	7 9 5
実施例23	8 0 6
実施例24	8 6 0
実施例25	7 6 4
実施例26	6 2 1
実施例27	5 4 6
実施例28	5 0 7
実施例29	5 7 3
実施例30	5 1 6

[0143]As shown in Table 2, the organic electroluminescence element of this example showed luminescence luminosity also with good low voltage.

[0144]About the organic electroluminescence element of Embodiment 25, when carrying out continuation luminescence by current density 1 mA/cm^2 , stable luminescence was able to be observed for 200 hours or more.

[0145]

[Effect of the Invention]The amino compound which has the outstanding electric charge transport capacity by this invention was provided. By using this compound, it excels in initial electrophotographic properties, such as sensitivity, the electric charge transportation characteristic, initial surface potential, and a dark extinction ratio, and it comes also out of the fatigue to repetition use to obtain the organic electroluminescence element excellent in endurance with low luminescence starting potential with little large electro photography photo conductor and luminescence intensity.

[Brief Description of the Drawings]

[Drawing 1]The outline lineblock diagram of the example of 1 composition of an organic electroluminescence element.

[Drawing 2]The outline lineblock diagram of the example of 1 composition of an organic electroluminescence element.

[Drawing 3]The outline lineblock diagram of the example of 1 composition of an organic

electroluminescence element.

[Drawing 4]The outline lineblock diagram of the example of 1 composition of an organic electroluminescence element.

[Drawing 5]The infrared absorption spectrum of a compound (1).

[Explanations of letters or numerals]1: anode 2:organicity electron hole pouring transportation layer 3:organicity luminous layer 4: -- negative pole 5 -- :organicity electronic pouring transportation layer 6:organicity luminescent material 7:electric charge transportation material 8: -- lead

[Translation done.]